KEITHLEY Model 4200-SCS Startup Guide

Start Here! It's easy...

Step 1	Unpack your Keithley 4200-SCS
Step 2	System connections – Power cord, keyboard, and printer (optional)
Step 3	Connect DUT test fixture to 4200-SCS
Step 4	Power-up & log-in
Step 5	Start KITE, open the "default" project, and select the "vds-id" test
Step 6	Test definition
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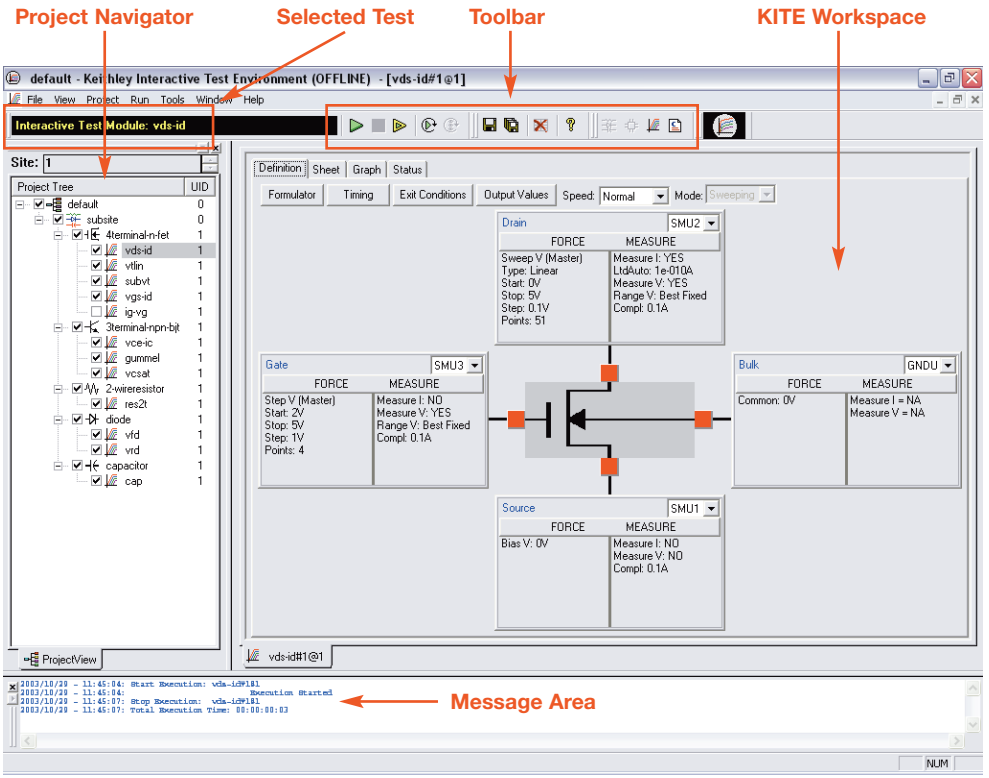
This Startup Guide selects the "default" project and runs the "vds-id" test. If you wish to select a different project and/or test, you must modify the procedures accordingly. **Figure 1** shows how the KITE window will look after the "default" project and "vds-id" test is selected.

Figure 1: KITE interface ("default" project shown with "vds-id" test selected)



Step 1 Unpack your Keithley 4200-SCS

What's in the box:

- 4200-SCS System – SMUs are built-in, and PreAmps are installed on the rear panel of the mainframe. A PreAmp adds five lower current source-measure ranges to an SMU (10nA, 1nA, 100pA, 10pA, and 1pA). The PreAmps can be removed from the rear panel and mounted remotely on a tester.
- Cables – 2 for each SMU.
- Y-Cable – Use to connect keyboard (with pointing device) to mainframe.
- Power cord
- 4200-SCS KTE Interactive CD-ROM
- 4200-SCS Complete Reference CD-ROM

How to lift:

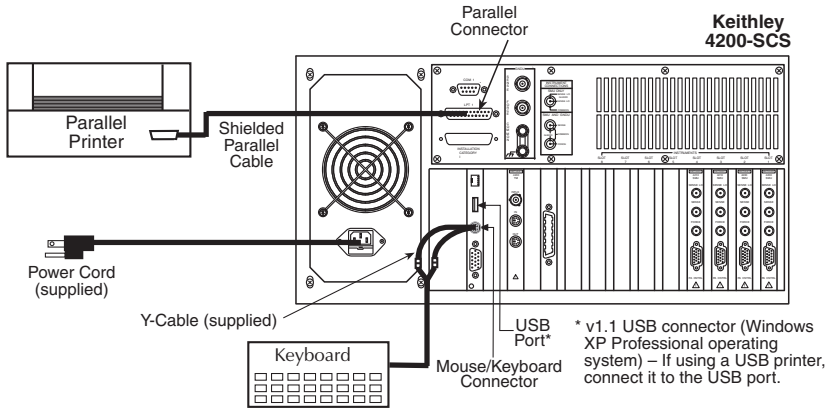
- Lift the 4200-SCS from the bottom.
- Do not lift from the front bezel.
- Set on a bench or install in a rack with the optional slide rack mounting kit.

Step 2 System connections – Power cord, keyboard, and printer (optional)

Basic system connections to the 4200-SCS (shown in **Figure 2**) include the keyboard (which has a built-in pointing device), the supplied power cord, and an optional printer. If using a USB printer, connect it to the USB port.

WARNING Plug the female end of the supplied power cord into the 4200-SCS, but DO NOT connect the male end to line power at this time. Steps 2 and 3 of this Startup Guide must be performed with the line power disconnected.

Figure 2: System connections



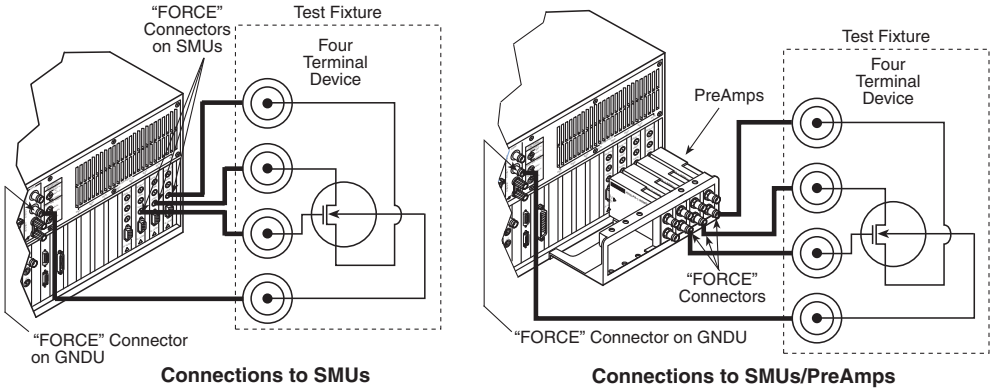
Step 3 Connect DUT test fixture to 4200-SCS

Figure 3 shows how to connect a test fixture for a 4-terminal device to the 4200-SCS. The test fixture must be equipped with standard 3-lug female triax connectors.

- **Connections to SMUs** – To connect directly to an SMU, use a Mini triax cable that is terminated with a miniature male triax connector on one end and a standard 3-slot male triax connector on the other end.
- **Connections to PreAmps** – To connect to a PreAmp, use a cable that is terminated with a standard 3-slot male triax connector on both ends.

NOTE Connections are snug; push firmly.

Figure 3: DUT test fixture connections to 4200-SCS



Step 4 Power-up & log-in

A. Make sure the power switch is in the O (out) position. The POWER switch is located on the front panel in lower right-hand corner.

B. Plug the male end of the line cord into a properly grounded AC line power receptacle.

C. Turn on the 4200-SCS by pushing in the **POWER** switch to the I (in) position.

D. When prompted, simultaneously press **Ctrl - Alt - Del**.

E. At the KIUSER prompt, press **ENTER**. There is no password for this account.

CAUTION When first starting a KTE-Interactive software tool, you must answer "Yes" to an on-screen license agreement. Answering "No" makes your system nonfunctional until you reinstall the software.

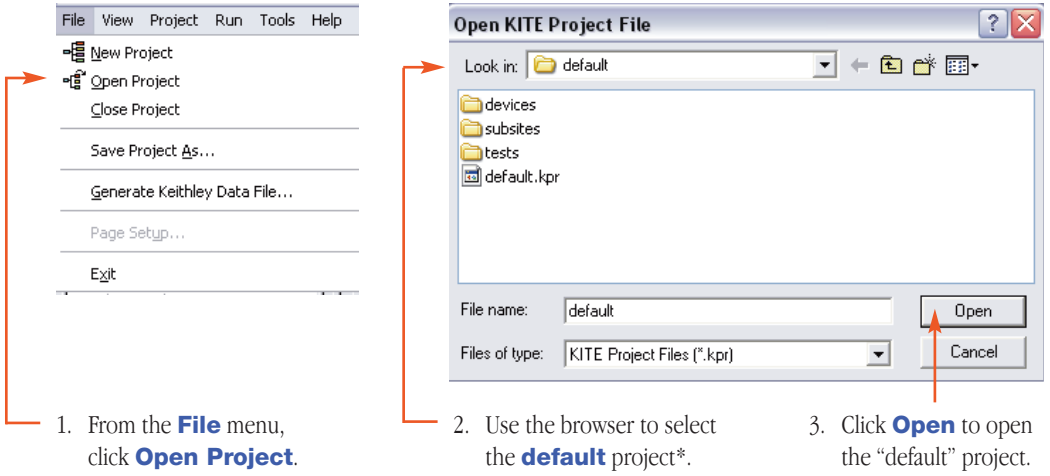
Step 5 Start KITE, open the "default" project, and select the "vds-id" test

A. Start KITE by double-clicking the following **KITE** icon on the Windows desktop:

B. When KITE starts, the "default" project will open automatically if it has been set as the default project. If a different project opens, perform the three steps in **Figure 4** to open the "default" project. The Project Navigator for the "default" project is shown in **Figure 1**.

NOTE **If the Project Navigator is not displayed when KITE is started, click the View menu and select the Project Navigator item. The View menu is located at the upper left-hand side of the KITE window.**

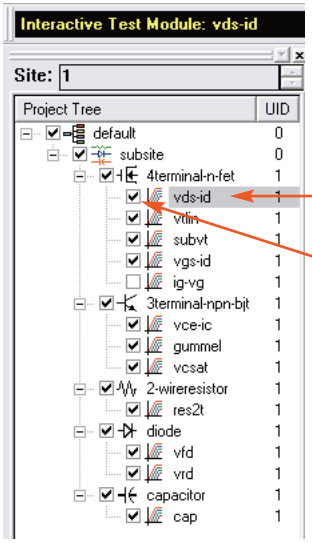
Figure 4: Open "default" project



* When browsing, use the following directory path to locate the "default.kpr" project file: C:\S4200\kiuser\Projects\default\default.kpr

C. Select the "vds-id" test and display the test **Definition** tab as shown in **Figure 5**. The **Definition** tab for the "vds-id" test is shown in **Figure 6**.

Figure 5: "default" Project Navigator – selecting the "vds-id" test



Double-click "vds-id" to select the test and display the test **Definition** tab.

The checkbox for "vds-id" must be checked in order to run the test. If unchecked, click the checkbox to insert a ✔.

Step 6 Test definition

The test is defined from the test **Definition** tab shown in **Figure 6**. As shown in the tab, the device is connected to three SMUs and the Ground Unit (GNDU). In general, SMU3 is used as a voltage step function to provide four different gate voltages (2V, 3V, 4V, and 5V). SMU2 is used to perform a 51 point sweep of drain voltage (0V to 5V) at each gate voltage. A current measurement is performed at each voltage sweep point.

A. If desired, the setup for SMUs and the GNDU can be changed. A settings window is displayed by clicking the appropriate **FORCE MEASURE** bar as shown in **Figure 6**. **Figure 7** shows the settings window for SMU3. The settings windows for the other SMUs and GNDU are similar.

Figure 6: "vds-id" Definition tab - How to display a setup window for SMUs and GNDU

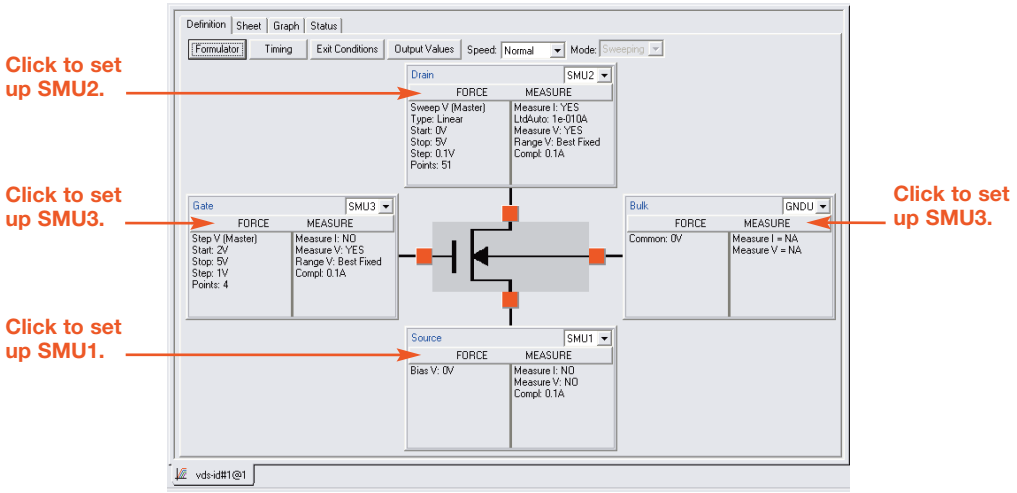
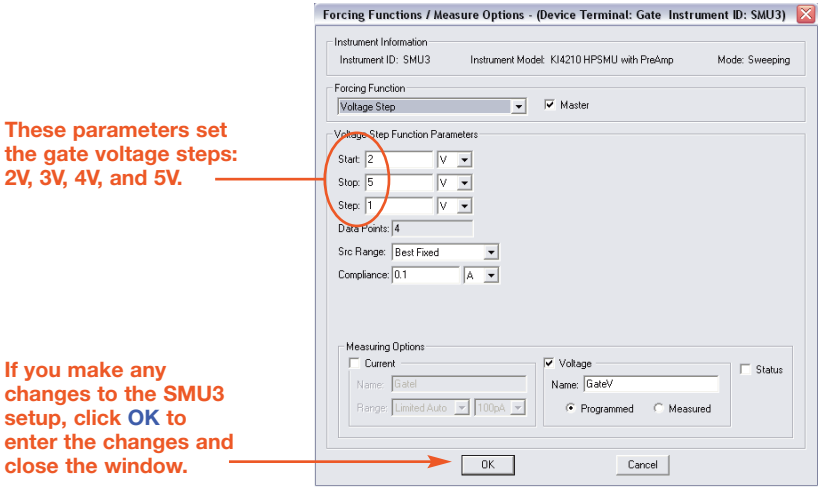


Figure 7: Setup for SMU3



B. After making any changes to the test definition, click **Save All** on the toolbar to save the settings:

Step 7 Run "vds-id" test

A. In the Project Navigator (see **Figure 5**), make sure the "vds-id" test is highlighted and the checkbox is checked.

B. On the toolbar, click the green **Run Test** button to run the test one time:

While the test is running, the **Run Test** button turns gray and the **Abort Test** button turns red. Also the MEASURING indicator (located on lower right-hand corner of the front panel) will be on while the test is running. When the test if finished, the **Run Test** button turns green.

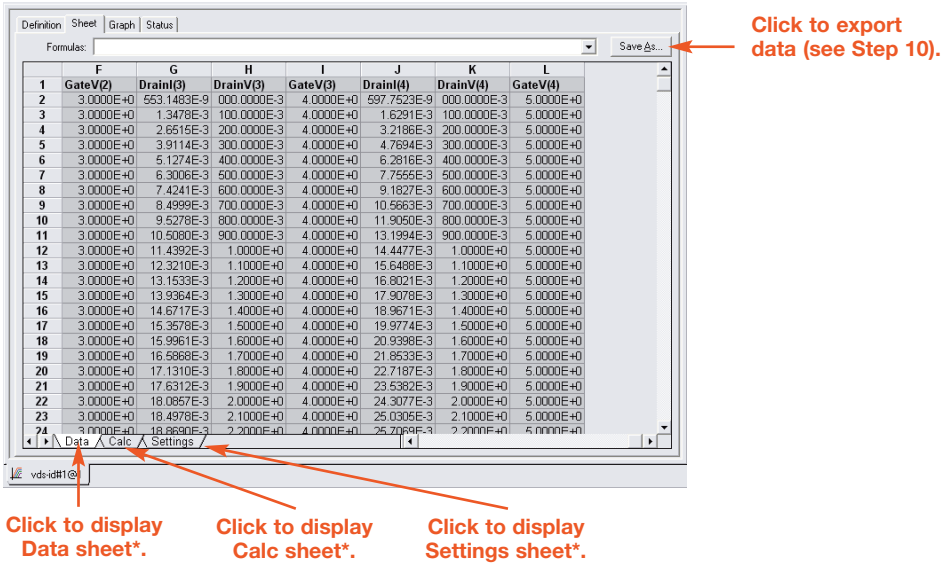
Troubleshooting hints:

- A selected test will not run if the **Run Test** button is not green. Here are a few reasons why the **Run Test** button will not be green:
  - A test is still running.
  - The checkbox for the test is not checked (see **Figure 5**).
  - Changes to the test setup were not saved (see Step 6B).
- If a selected test still will not run, click the **Status** tab for the test. This tab provides status information for the test.

Step 8 View data sheet

The data sheet for the "vds-id" test is displayed by clicking the **Sheet** tab for the test. Use the tabs at the bottom of the **Sheet** to display the data type. A sample data sheet for the "vds-id" test is shown in **Figure 8**.

Figure 8: Sample data sheet for "vds-id" test



	F	G	H	I	J	K	L
1	GateV(2)	DrainI(3)	DrainV(3)	GateV(3)	DrainI(4)	DrainV(4)	GateV(4)
2	3.0000E+0	553.1483E-9	000.0000E-3	4.0000E+0	597.7523E-9	000.0000E-3	5.0000E+0
3	3.0000E+0	1.3478E-3	100.0000E-3	4.0000E+0	1.6291E-3	100.0000E-3	5.0000E+0
4	3.0000E+0	2.6515E-3	200.0000E-3	4.0000E+0	3.2186E-3	200.0000E-3	5.0000E+0
5	3.0000E+0	3.9114E-3	300.0000E-3	4.0000E+0	4.7694E-3	300.0000E-3	5.0000E+0
6	3.0000E+0	5.1274E-3	400.0000E-3	4.0000E+0	6.2816E-3	400.0000E-3	5.0000E+0
7	3.0000E+0	6.3006E-3	500.0000E-3	4.0000E+0	7.7555E-3	500.0000E-3	5.0000E+0
8	3.0000E+0	7.4241E-3	600.0000E-3	4.0000E+0	9.1827E-3	600.0000E-3	5.0000E+0
9	3.0000E+0	8.4999E-3	700.0000E-3	4.0000E+0	10.5663E-3	700.0000E-3	5.0000E+0
10	3.0000E+0	9.5278E-3	800.0000E-3	4.0000E+0	11.9050E-3	800.0000E-3	5.0000E+0
11	3.0000E+0	10.5080E-3	900.0000E-3	4.0000E+0	13.1994E-3	900.0000E-3	5.0000E+0
12	3.0000E+0	11.4392E-3	1.0000E+0	4.0000E+0	14.4477E-3	1.0000E+0	5.0000E+0
13	3.0000E+0	12.3210E-3	1.1000E+0	4.0000E+0	15.6488E-3	1.1000E+0	5.0000E+0
14	3.0000E+0	13.1533E-3	1.2000E+0	4.0000E+0	16.8021E-3	1.2000E+0	5.0000E+0
15	3.0000E+0	13.9364E-3	1.3000E+0	4.0000E+0	17.9078E-3	1.3000E+0	5.0000E+0
16	3.0000E+0	14.6717E-3	1.4000E+0	4.0000E+0	18.9671E-3	1.4000E+0	5.0000E+0
17	3.0000E+0	15.3578E-3	1.5000E+0	4.0000E+0	19.9774E-3	1.5000E+0	5.0000E+0
18	3.0000E+0	15.9961E-3	1.6000E+0	4.0000E+0	20.9398E-3	1.6000E+0	5.0000E+0
19	3.0000E+0	16.5868E-3	1.7000E+0	4.0000E+0	21.8533E-3	1.7000E+0	5.0000E+0
20	3.0000E+0	17.1310E-3	1.8000E+0	4.0000E+0	22.7187E-3	1.8000E+0	5.0000E+0
21	3.0000E+0	17.6312E-3	1.9000E+0	4.0000E+0	23.5382E-3	1.9000E+0	5.0000E+0
22	3.0000E+0	18.0857E-3	2.0000E+0	4.0000E+0	24.3077E-3	2.0000E+0	5.0000E+0
23	3.0000E+0	18.4978E-3	2.1000E+0	4.0000E+0	25.0305E-3	2.1000E+0	5.0000E+0
24	3.0000E+0	18.8690E-3	2.2000E+0	4.0000E+0	25.7069E-3	2.2000E+0	5.0000E+0

* To select more than one sheet for selective printing, hold down the **Ctrl** key and then click the tab. See Step 10 to print Sheet data.

Step 9 View graph

The graph for the "vds-id" test is displayed by clicking the Graph tab for the test. A sample graph for the "vsd-id" test is shown in **Figure 9**. As shown, there are four I-V curves – one for each gate voltage. The graph was customized to include the Legend box and use different colors for the graph series. The Graph Settings menu (shown in **Figure 10**) was used to select the Legend box and change series colors.

Figure 9: Sample graph for "vds-id" test

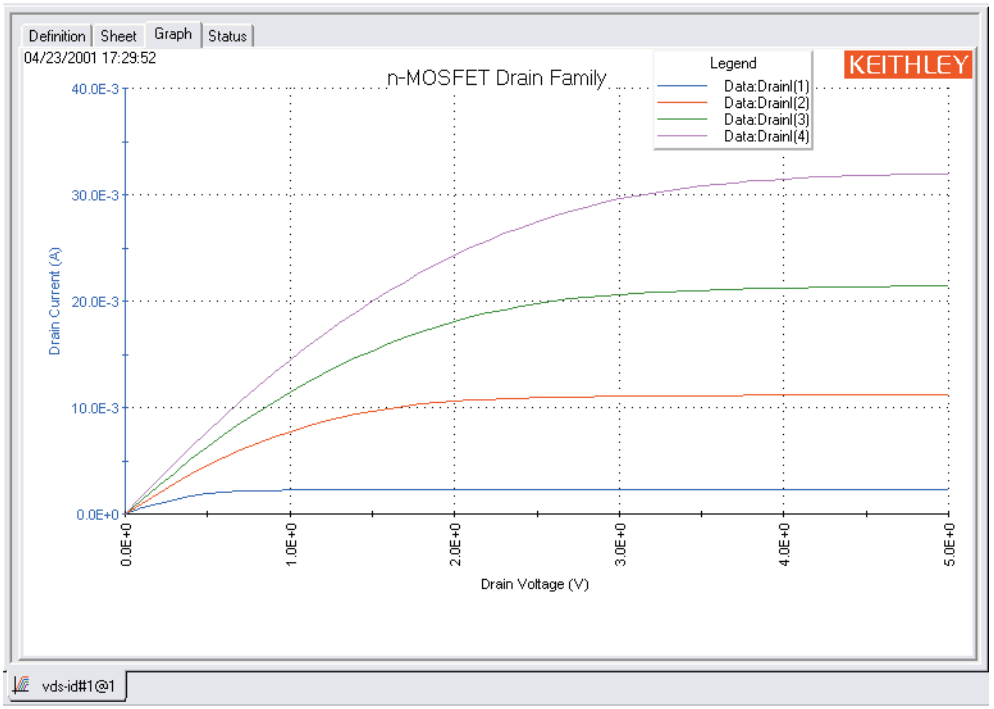
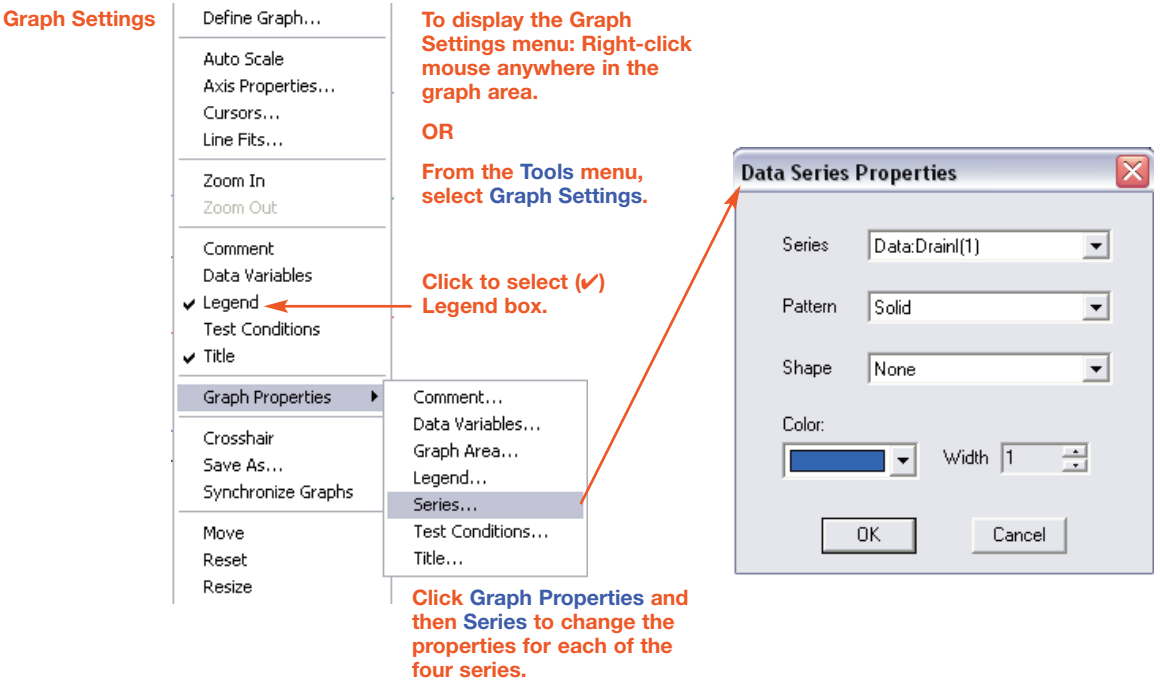


Figure 10: Graph settings menu



Step 10 Printing and exporting data

Printing Sheet data

A. In the KITE workspace, click the **Sheet** tab to display test data. You can selectively print the **Data** sheet, **Calc** sheet, and/or the **Settings** sheet. **Figure 8** shows how to select sheets for printing.

B. From the **FILE** menu (at the upper left-hand side of the KITE window), select the **Print** option.

C. In the **Print** setup window, there are two print options. You can print the **Selected Sheet(s)** (Data, Calc, and/or Sheet) or the **Entire Workbook** (Data, Calc, and Sheet).

D. In the **Print** setup window, click **OK** to print the data.

Printing the Graph

A. In the KITE workspace, click the **Graph** tab to display the graph.

B. From the **FILE** menu (at the upper left-hand side of the KITE window), select the **Print** option.

C. In the **Print** setup window, click **OK** to print the graph.

Exporting data into MS Excel-compatible Worksheet

A. In the KITE workspace, click the **Sheet** tab to display the test data.

B. In the Sheet tab, click the **Save As** button as shown in **Figure 8**.

C. From the **Save As** setup window, specify a file name and path and click **Save**. The default directory path for exporting data is C:\S4200\kiuser\export.

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